

Parental Perceptions of Barriers to Blood Lead Testing

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ABSTRACT

Introduction: This study identified barriers to blood lead testing from the perspective of parents of young children eligible for Medicaid.

Method: Data were gathered from three focus groups. Participants were asked if they were familiar with the dangers of high blood lead levels, rationale for not having a child tested for blood lead, what would facilitate having blood lead testing, and how they wanted to learn about blood lead poisoning.

Results: Most parents ($n = 30$) were unfamiliar with the causes and effects of lead poisoning. While many reported their child had been tested for lead, others were unsure because they were not told the purpose of blood draws. Participants suggested that having all services in one facility would decrease travel and thus facilitate blood lead testing; others wanted the discomfort associated with phlebotomy minimized. Participants preferred to learn about lead poisoning from low-literacy brochures, videos, and television ads.

Discussion: Nurses should institute measures in their practice sites to improve blood lead poisoning prevention education and blood lead testing rates and to reduce the pain and anxiety associated with this procedure. *J Pediatr Health Care.* (2005). 19, •••.

Lead poisoning remains the major environmental health problem for young children, with approximately 6% of children 1 to 2 years old and 3.5% of children between 3 to 5 years old having elevated blood lead levels (EBL) ($\geq 10 \mu\text{g/dL}$). Prevalence rates are higher for children who are poor, of non-Hispanic Black race, or living in older housing (Center for Disease Control and Prevention [CDC], 2000; Manton, Angle, Stanek, Reese, & Kuehnemann, 2000; Meyer, Dignam, Homa, Schoonover, & Brody, 2003; Vivier et al., 2001). Lead poisoning at levels $10 \mu\text{g/dL}$ or greater has been associated with learning disabilities, behavioral changes, hyperactivity, impaired growth, mental retardation, coma, seizures, and death (Burns, Baghurst, Sawyer, McMichael, & Tong, 1999; Needleman, Riess, Tobin, Biesecker, & Greenhouse, 1996). More recently, adverse effects such as decreased academic performance have been associated with blood lead levels (BLL) below $10 \mu\text{g/dL}$ (Lanphear, Dietrich, Auinger, & Cox, 2000; Schwartz, 1994; Tong, Baghurst, Sawyer, Burns, & McMichael, 1998). Approximately 26% of non-Hispanic Black children, 28% of Mexican-American children, and 19% of non-Hispanic White children ages 1 to 5 years have a BLL of $\geq 5 \mu\text{g/dL}$ (Bernard & McGeehin, 2003). For children with very high EBLs requiring chelation (BLL $45 \mu\text{g/dL}$ or higher), there is no evidence of reduction or reversal of cognitive injury (Bellinger, 2004; Rogan et al., 2001). Blood lead testing has been identified as a critical strategy in the elimination of elevated BLLs in children, a Healthy People 2010 objective (President's Task Force, 2000; Tinker & Keiser, 1997; US Department of Health and Human Services, 2000).

The Centers for Medicaid and Medicare Services' (CMS) policies require that all children enrolled in Medicaid undergo blood lead testing

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TABLE. Selection of readily available blood lead poison prevention educational resources

Resource title	Resource type	Internet site
Sites with multiple resources and links		
CDC Childhood Lead Poisoning Prevention Program	Multiple links	http://www.cdc.gov/nceh/lead/lead.htm
Environmental Protection Agency	Multiple links	http://www.epa.gov/lead
National Lead Information Center Hotline: 1-800-532-3394	Order materials, speak to specialist	http://www.epa.gov/opptintr/lead/nlic.htm
National Lead Information Center	Lead Information	http://www.epa.gov/lead/nlic.htm
National Safety Council	Multiple links	http://www.nsc.org/issues/lead/
U.S. Department of Housing and Urban Development: Office of Healthy Homes and Lead Hazard Control	Multiple links	http://www.hud.gov/offices/lead/
Provider information and guidelines		
Managing Elevated Blood Lead Levels Among Young Children: Recommendations from the Advisory Committee on Childhood Lead Poisoning Prevention	128-page document	http://www.cdc.gov/nceh/lead/CaseManagement/caseManage_main.htm
Preventing Lead Exposure in Young Children	60-page document	http://www.cdc.gov/nceh/lead/Publications/Primary%20Prevention%20Document.pdf
General information for parents		
Facts About Lead (available in Spanish)	5 short facts	http://www.epa.gov/lead/leadinfo.htm#facts
General Lead Information: Questions and Answers	Short answers	http://www.cdc.gov/nceh/lead/
Identifying Children With Elevated Blood Lead Levels	Fact Sheet	http://www.cdc.gov/nceh/lead/faq/about.htm
Lead (Alliance for Healthy Homes)	Fact Sheet	http://www.nsc.org/issues/lead/bloodlead.htm
Lead (EnviRN)	Fact Sheet	http://www.aeclp.org/hhe/hhe_lead.htm
Lead Poisoning	Fact sheet	http://envirn.umaryland.edu/hazards/lead.htm
Ten Tips to Protect Children From Pesticide and Lead Poisonings Around the Home	2-page flyer	http://www.cehn.org/cehn/leadpoisoning.html
Understanding Lead Terminology	2-page flyer	http://www.epa.gov/lead/tentips.pdf
What You Can Do to Protect Your Family	Fact Sheet	http://www.nsc.org/issues/lead/leadglossary.htm
Where Lead Is Found	15 bullet points	http://www.epa.gov/lead/leadinfo.htm#protect
Where Lead Is Likely to Be a Hazard	10 bullet points	http://www.epa.gov/lead/leadinfo.htm#hazard
Where Lead Is Likely to Be a Hazard	4 bullet points	http://www.epa.gov/lead/leadinfo.htm#hazard
Lead and nutrition/food		
Lead and a Healthy Diet: What You Can Do To Protect Your Child (available in Spanish)	10-page flyer	http://www.epa.gov/lead/nutrition.pdf
Lead in Candy: Questions and Answers	Short answers	http://www.cdc.gov/nceh/lead/faq/candy.htm
Lead Poisoning and Nutrition	Fact sheet	http://www.nsc.org/issues/lead/leadnutrition.htm
Lead in Water		
Lead in Water: Questions and Answers	Fact sheet	http://www.cdc.gov/nceh/lead/spotLights/leadinwater.htm
Lead in Water	Fact sheet	http://www.nsc.org/issues/lead/leadinwater.htm
Health Effects		
Health Effects of Lead	22 bullet points	http://www.epa.gov/lead/leadinfo.htm#health
Health Effects on Children	Fact sheet	http://www.nsc.org/issues/lead/healtheffects.htm
Lead and the Home		
Are You Planning to Buy or Rent a Home Built Before 1978?	3 bullet points	http://www.epa.gov/lead/leadinfo.htm#buy
Checking Your Family and Home for Lead	15 bullet points	http://www.epa.gov/lead/leadinfo.htm#checking
Finding a Qualified Lead Professional for Your Home	Tri-fold brochure	http://www.epa.gov/lead/broch32e.pdf
Lead in Your Home? A Parent's Reference Guide	67-page document	http://www.epa.gov/lead/leadrev.pdf
Lead Paint Safety: A Field Guide for Painting, Renovation, and Home Maintenance	84-page document	http://www.epa.gov/lead/leadsafetybk.pdf
Protect Your Family From Lead in Your Home (available in Spanish)	17-page brochure	http://www.epa.gov/lead/leadpdf.pdf
Real Estate Lead Disclosure Requirements	Fact sheet	http://www.nsc.org/issues/lead/leaddisclosure.htm
Reducing Lead Hazards When Remodeling Your Home	26-page document	http://www.epa.gov/lead/rrpamph.pdf
Remodeling or Renovating a Home with Lead-Based Paint?	1-page flyer	http://www.epa.gov/lead/leadinfo.htm#remodeling
Renovating, Remodeling, and Lead	Fact sheet	http://www.nsc.org/issues/lead/leadrenovation.htm
Specialized Cleaning	Fact sheet	http://www.nsc.org/issues/lead/leadcleaning.htm
Testing Your Home for Lead in Paint, Dust, and Soil	20-page document	http://www.epa.gov/lead/leadtest.pdf
Lead—Miscellaneous		
Lead in Folk Medicine: Questions and Answers	Short answers	http://www.cdc.gov/nceh/lead/faq/folk%20meds.htm
Lead in Jewelry: Questions and Answers	Short answers	http://www.cdc.gov/nceh/lead/faq/jewelry.htm
Lead Safe Work Practices	Fact sheet	http://www.nsc.org/issues/lead/leadsafework.htm
Videos		
Lead Poisoning: A Parent's Guide to Prevention	18-minute video	http://world.std.com/~rsinrod/
Living with Lead	58-minute video	http://www.videoproject.net/living_with_lead.html

continued

Resource title	Resource type	Internet site
Sesame Street Lead Away!	15-minute video	http://www.epa.gov/lead/nlicdocs.htm
Posters		
Lead in Your Home: A Parent's Reference Guide	18" X 24" poster	http://www.epa.gov/lead/nlicdocs.htm
Lead Poisoning and Your Children (available in Spanish)	11" X 17" poster	http://www.epa.gov/lead/lpandyc.pdf
Runs Better Unleaded	8.5" X 11" Poster	http://www.epa.gov/lead/leadpbed.htm#Brochures
Something Is Dangerously Wrong With This Picture	Poster	http://www.epa.gov/lead/nlicdocs.htm
Before you Renovate, Investigate	Poster	http://www.epa.gov/lead/nlicdocs.htm

at ages 12 and 24 months. Children between 36 and 72 months should be tested if they had not previously been tested. Vivier et al. (2001) found that 85% (n = 690) of children between 1 and 2 years of age enrolled in a Rhode Island Medicaid managed care plan affiliated with one teaching hospital had a BLL. Of these, 27.5% (n = 190) had a BLL above 10 µg/dL. The U.S. General Accounting Office (GAO) (1998) estimates that 535,000 children (9%) receiving Medicaid had an EBL and that the majority of children with EBL are Medicaid eligible. In contrast to the findings of Vivier et al., the GAO found that 81% of the children enrolled in Medicaid had not had a BLL. The GAO concluded that CMS's mandatory testing policy has not adequately identified children with EBL (CDC, 2000; U.S. GAO). In Ohio, where this study occurred, 4700 children had BLLs at or above 10 µg/dL in 2003. A data-harmonizing project using the Ohio Department of Health (ODH) lead surveillance data and the Ohio Department of Job and Family Services (ODJFS) Medicaid claims data revealed that only 32% of children enrolled in Medicaid were tested for lead (ODH, 2004). Little is known regarding barriers to testing children who are eligible for Medicaid for BLLs.

Although parental refusal or parents not requesting a blood lead test for their child have been identified as barriers by health care professionals, and anticipatory guidance protocols generally include lead poisoning prevention education of parents/guardians of young chil-

dren, most parents do not recall receiving such guidance (Goldman, Demissie, DiStefano, McNally, & Rhoads, 1998; Mahon, 1997). Mahon found that only 11% of the 80 Philadelphia parents/caregivers interviewed identified lead poisoning as a major health concern. More than half of the respondents incorrectly identified Philadelphia as a city at low risk for lead poisoning. Of the 32 participants who recalled someone talking to them about lead poisoning, more than 70% reported that the information was from a physician or other health care provider. Approximately 40% of the respondents recalled having read some information on lead poisoning prevention. Similarly, Mehta and Binns (1998) reported that 34% of the 2225 Chicago area parents responding to a survey on lead knowledge recalled receiving information on lead poisoning prevention from a health care provider. In contrast, 63% of 271 respondents attending a Wisconsin lead testing clinic had prior information on lead risks (Porter, 1997). In the only published study that addressed barriers to blood lead testing, Kegler, Stern, Whitecrow-Ollis, and Malcoe (2003) explored the topic in an American Indian community. Identified barriers to lead testing for the 332 respondents included parents/caregivers not wanting to see their child hurt (10.5%), lack of transportation or money for the test (5.1%), lack of time (4.8%), forgetting about the need for a blood lead test (3.0%), and not knowing where to get the test (1.5%). Multivariate analysis revealed the odds of a child

having an annual blood lead test were 1.5 times greater if the parent/caregiver was self-confident in their ability to obtain the testing. The objectives of this study are to further explore barriers to blood lead testing and current levels of awareness of the dangers of lead poisoning from the perspective of parents and caregivers of young children eligible for Medicaid. Findings presented here are from a larger study in which barriers to blood lead testing were explored from the perspectives of parents/caregivers as well as Medicaid health care providers.

METHOD

Sites

Three focus groups were convened to address the research objectives. Based on ODH criteria, Ohio's 88 counties were categorized as predominately urban, suburban, or rural. Three counties—one rural, one urban, and one suburban—were randomly selected as focus group sites.

Procedures

Women, Infant, Children (WIC) and Help Me Grow offices were contacted in the randomly selected counties and asked to participate in the study by organizing a group of parents for a focus group during a regularly scheduled parent group meeting. Help Me Grow is a program for Ohio's at-risk expectant parents, infants, and toddlers that provides health and developmental services (<http://www.ohiohelpmegrow.org>). Parents/caregivers of a Medicaid-eligible child 6 years of age

or younger were able to participate.

Parents were informed of the pending focus group by agency staff prior to attending the meeting. Agency staff at each site confirmed that participants met the eligibility criteria. All three focus groups followed the same procedures. After potential participants arrived and were guided to a private room, the study purpose and procedures were explained. Parents were assured that nonparticipation would not incur consequences for the parent or child, there would be no penalty for withdrawal, notes would be taken but would not contain identifying information, and audiotapes of the discussion would be listened to but not transcribed. Participants then signed an informed consent form. Refreshments were provided and attendees were given a small incentive (a school lunch box filled with educational materials) for their participation. Focus groups were led by an experienced moderator to guide the discussion and to maximize participant interaction. The moderator focused disclosures through open-ended questions within an accepting environment. An assistant moderator operated a tape recorder, took comprehensive notes, attended to environmental conditions and logistics, and responded to unexpected interruptions. Focus group tapes and written notes were reviewed and data were assessed for patterns to responses. The Institutional Review Board at The Ohio State University approved this study.

Focus Group Participants

The first focus group was held in an urban-area WIC office and included six African-American participants. One participant left after 15 minutes to pick up a child. The second focus group meeting occurred in a rural area and included 15 women and 2 men recruited from the county's Help Me Grow program. One participant was African-American; the others were white. The final focus group meeting took place in a suburban county WIC office. All seven

participants were white women; two were grandmothers caring for young children, and the other five were mothers. All participants in the rural and suburban focus groups remained the entire session. There were a total of 30 participants in the three focus groups. All three focus groups lasted about 1 hour.

Focus Group Questions

The structured discussion was focused around four open-ended questions: (a) What have you heard about the dangers of high blood lead levels in young children? How did you learn about this informa-

dren can die from it. Kids don't eat a lot when they have high blood lead levels." Several participants noted they first heard about blood lead testing during a well-child visit. Two women from the suburban area focus group mentioned they had learned about lead from the TV. Other suburban participants said they had read about lead poisoning in either a parenting magazine or from materials given at the hospital when they were discharged with their newborn.

One woman said that she was given a pamphlet on lead when she purchased her home. Another

Parents preferred to have their children tested at the hospital because they appreciated the efforts taken to make the procedure more comfortable for the child.

tion? (b) Has your child's blood been checked for lead? If yes, describe the circumstances. If no, can you talk about your decision? What factors (beliefs, people, potential, etc) influenced your decision? (c) What things would make it easier for you (or someone you know) to have a child's blood lead level checked? And (d) How do you like to learn about facts important to your child's health such as blood lead poisoning?

RESULTS

Blood Lead Poisoning

Responses to the initial question concerning what participants had heard about the dangers of high BLLs in young children revealed that many focus group attendees were unaware of the danger of lead in the environment: "I've never heard of a lead problem." Others commented about the impact of lead or sources of lead poisoning: "Lead makes the child sick." "You get lead poisoning from dirt, paint off the wall, pencils." "Lead poisoning causes blood disorders, it can bother the heart; chil-

noted that the landlord had them complete a survey that mentioned lead poisoning. Another stated, "HUD has to check your house for lead before you can move in." A mother in the urban focus group noted that her daughter, with a BLL of 29 µg/dL, had a number of times watched a video using popular television characters that was aimed at educating preschool children regarding lead poisoning prevention and that she was able to sing a song from the video. This mother also stated that someone came to her home once to determine the source of the lead but never returned as promised. Other participants of the urban focus group agreed there was a problem in getting the city to follow through on its commitment to lead abatement.

Participants asked a number of questions about lead exposure, lead testing, and lead poisoning. They were very interested in learning more on this topic. Parents asked if children should automatically be tested for lead or if they should be

looking for signs/symptoms to alert them to have their children tested. Other questions included the following: "Doesn't lead cause ADD [attention deficit disorder]?" "How often should I have my child tested?" "If children are diagnosed with ADD, are they automatically tested?" "What do you do if your child is lead poisoned?" "Does lead keep a child from eating?" The participant asking this last question said her granddaughter was too small for her age and that she had no interest in eating. She thought it was due to lead poisoning. "Do old trailers have lead paint?" one participant asked. One father said he works with lead at his job but he did not realize that he could be exposing his child to lead via his work clothes.

Participants were confused about which blood tests their children had received. They noted that health care providers took blood but they did not tell them what tests the blood was for. One participant commented that a provider had asked about the different environments in which her child had played or lived in order to determine if there were various routes of exposure. One provider even asked if the parents were separated to determine possible exposures from both living environments. Another parent commented, "If your child doesn't get tested, you need to take your child to get screened."

Blood Lead Testing

When asked if their children had been tested for blood lead poisoning, many participants responded affirmatively. However, one suburban participant noted, "How do we know if they have been tested? If the doctor tested them, he didn't tell me. I wish the doctor would tell me what he does to my child." "How do you test them?" "Is it covered under normal insurance?" Several respondents noted they needed a medical form completed for Head Start and blood lead testing is part of that requirement. (Note: this requirement is specific to each Head Start pro-

gram; not all Ohio Head Starts require blood lead testing.) A few participants stated they were unable to have the BLL completed at the WIC clinic; "It would be easier if they could get their lead level at WIC." Others commented, "It's no big deal to get a blood lead test," "It's scary to find out your child has lead poisoning," "I'm not clear what lead poisoning means," and "Children can get it from anywhere."

One participant stated that her daughter was peeling paint off the wall and biting into the mini-blinds. The daughter was hyperactive and the mother took the child to her health care provider. The mother described the behaviors to the doctor and inquired about lead poisoning. The doctor diagnosed the child with ADD but did not test for lead. The child was 6 years old at the time of the focus group and had not yet been tested for lead poisoning.

Several participants from the rural area focus group noted they could obtain a BLL for their child either at the Health Department or at a local hospital. Hospital employees were perceived to be friendlier to the parents and the children. Parents preferred to have their children tested at the hospital because they appreciated the efforts taken to make the procedure more comfortable for the child.

When participants were asked, "Would you ever refuse to have your child tested for lead?" one rural participant replied, "Why would you ever refuse something that you know is going to help your child? It's such a small thing that could help so much." However, another participant answered, "It is my child and if I don't want them to be stuck, then I will refuse. It's my choice."

Facilitating Blood Lead Testing

When asked what would make it easier for you to have your child's blood lead level tested, a number of suggestions were mentioned. Several participants commented that blood lead testing should be required: "Blood lead testing should

be part of the physical check-up" and "You need mandatory screening." They also commented, "If you have Medicaid coverage, you have to use your medical card." "Blood lead testing should be free." "The doctors need to be open on Saturdays." "They need to have one facility where all services are provided." A suburban participant was unclear as to who was responsible for ensuring that her child was tested for blood lead levels, asking, "Are we supposed to ask them to do a lead screen, or do they just do it? They should tell us what they do to our children."

Some of the clinics perceived as "nicer" provided pacifiers or toys to divert the child's attention while having blood drawn. Other sites provided coloring books to the children after the blood was drawn. Participants commented that having these types of diversions available helped the child forget about the traumatic event. Another suggestion was to have the provider come to their home to do the blood draw. Participants remarked this would be less stressful for everyone.

A number of participants agreed that it would be helpful to have adequate blood drawn during a WIC visit to include both hemoglobin and a lead test. (Note: Only a few WIC clinics sporadically drew blood to determine BLLs at the time of this study.) A suggestion by an urban participant was to include a question on the WIC screening tool about blood lead testing and the results of the blood lead test. If the child had not had a BLL completed, WIC staff could encourage the parent/caregiver to obtain a BLL and provide a list of sites where this could be accomplished. Other comments included: "Hardest part of getting to the doctor is transportation." "If the lab was in the same building as the doctor's office, that would make it easy."

One urban mother with both biologic and foster children said that getting her biologic children tested was easy because she had private insurance. The Medicaid-eligible foster care children attended an

urban public health clinic. She stated that you had to arrive at the clinic by 9 AM, and you always had a long wait, even though the waiting room was empty.

Several participants mentioned their frustrations with those who draw the blood. "They just pin the child down and act as if they do not care at all. They make no effort to comfort the child, they just stick them and if they can't find a vein, they continue to stick them until they do." Participants noted that having blood drawn was very traumatic for the child. Parents recommend getting more skilled individuals to draw the blood so that they would not have to stick their child several times. Parents stated they would appreciate care and concern for their child who is having the blood drawn. In contrast, another parent reported being disturbed that a provider wanted to draw blood for a blood lead test when she was there for her child's immunizations. She said it was too much for a child to undergo in one day: "They shouldn't do it all at once."

Parent Educational Preferences

The final question parents were asked was how they preferred to learn facts about lead poisoning. Many parents agreed that lead education presented in pamphlets or brochures was fine, but the material needed to be readable. Others noted that they preferred to speak with their provider. Respondents in the urban and rural focus groups preferred to learn about lead via videos. They said they did not read pamphlets and if they did, they preferred that they be brief. Other parents commented that billboards might be an effective option for educating the public about lead. Several participants noted they wanted to learn about lead poisoning when their child was very young, not when the child was in preschool. A few advocated for public service announcements (PSAs) on television. These parents commented that the PSAs

they had seen were too brief. PSAs needed to be a longer, displayed more often, and should include a phone number where more information could be obtained.

Suburban parents suggested receiving a checklist from the physician regarding the services provided during the visit. They preferred a sheet that included both immunizations and blood tests. They wanted the provider to review all of the tests performed during a visit and for the visit to be more personal.

Other Comments

Other focus group members' comments address landlords, inspections, and moving. Several respondents commented that they had had issues with landlords and that the home inspectors did not come out often enough to their

blood lead testing requirements. Many parents did not know if their child had been tested, nor did they know the results of the testing if it had occurred. Parents clearly wanted more information on the blood lead testing process and the consequences of having a high BLLs. Parents requested the system be changed to more easily accommodate their multiple responsibilities. Most preferred that blood be drawn during a WIC or other clinic visit and that they not be required to travel to an additional location for the testing. Congruent with the findings of Kegler et al. (2003), parents also wanted well-trained phlebotomists. Parents appreciated health care workers who were able to distract the child with toys or activities during the blood drawing procedure. Although parents acknowledged

If lead in the water is suspected or confirmed, parents should be instructed to only use cold water for cooking, drinking, or reconstituting baby formula, and the cold water should be flushed for several minutes before use.

homes. Some respondents stated landlords were part of the problem; they would not repair the problems. "I had to move; my landlord didn't correct the problem." "Landlords need to keep their places up." "Moving is hard." In contrast, one respondent stated, "Where I was living was an old house with lead paint. The landlord helped with painting and my child's blood lead level went down."

DISCUSSION

The findings from these three focus groups provide new insights into the challenges of testing all Medicaid-eligible children ages 1 and 2 years of age for elevated BLLs. Parents revealed a great deal of misinformation related to methods of lead ingestion, symptoms, and

they received pamphlets or brochures related to lead poisoning prevention, they wanted the materials at the appropriate literacy level. They also wanted the educational information directly conveyed to them by their health care provider and to have videos available that could reinforce the messages.

This study had several limitations. Although three focus groups were conducted, and the size of the focus groups was within usual standards (Krueger, 1994), the total number of participants was small. Participants were a nonrepresentative sample, thus limiting the generalizability of the findings to the focus group participants. Future research is needed to determine if the findings of this study are congruent with a larger, random sam-

ple of Medicaid-eligible parents.

PRACTICE IMPLICATIONS

Assuring blood lead testing for all young children who are covered by Medicaid rests with the pediatric health professional. Professionals must balance the desire to minimize painful procedures and the pressure to omit a time-consuming procedure that slows clinic flow with appreciation of the serious potential for lifelong harm for children already vulnerable by virtue of poverty.

Rapid-cycle change procedures are ideal for accomplishing practice improvement in a short period (Langley, Nolan, Nolan, Norman, & Provost, 1996; Margolis, et al., 2004). The plan-do-study-act cycle of this strategy essentially applies the nursing process to creating quality improvement change in the clinical setting (McInerney, Meuer, & Lannon, 2003). Key practice personnel come together to identify how best to reach the goal, in this case, 100% of all young children covered by Medicaid receiving BLLs. During the planning phase, the cycle begins with a review of results from a random sample of patient records for young children 12 to 36 months of age covered by Medicaid to identify the percentage receiving the mandated BLL testing during their second and third years of life. Based on the results, a review of processes considers the following: how children's lead testing needs are identified, prompt systems to alert the provider, parent education materials, documentation of services, better chart screening strategies to identify children in need of testing, patient follow-up for testing and treatment, and systems for monitoring effectiveness. The staff involved in the change identify two to three aspects of practice change that will help them reach the goal with strategies that might include improving the blood drawing skill of clinic personnel, obtaining parent education materials on the dangers of lead exposure and identifying a distribution process, or an identification and re-

minder process to assist providers in remembering to order the test. The quality improvement team also solicits the endorsement of the practice leader for the desired change. Finally, the team sets a date for re-evaluation after allowing an adequate time to make the improvement a reality, usually not longer than a week or two later, depending on the volume of Medicaid patients.

Once the plan of action is identified, the "Do" phase begins with implementation of the action plan. It is a good idea to meet regularly during the implementation phase to evaluate how each part of the change process is going and to solve process problems that often arise despite sound planning. Regular meetings also provide the opportunity to acknowledge and reward, if only with verbal recognition, the staff members who are making the change a

2000; Committee on Environmental Health, 1998). Ideally this should begin when infants are 6 months of age as infants use their newly acquired mobility and control of their hands to actively explore the world. Parent completed lead screening questionnaires are also a way to heighten parent awareness of the sources of exposure to lead (Committee on Environmental Health). This is an ideal time to promote frequent, effective hand washing as a foundational strategy for protection from environmental and pathogenic hazards (Morton & Schultz, 2004). Education should also focus on weekly cleaning of window frames, window sills, and other surfaces using warm water and an all-purpose cleaner. Areas where children play should be kept as dust free as possible. Pacifiers, bottles, and toys should be washed often and espe-

Although finger stick lead tests are available, they are less reliable because they are subject to falsely high results as a result of residual skin contamination with lead...

reality and to encourage others in this team effort.

After the agreed-upon change period is complete, progress is assessed through a second chart review to measure progress toward the goal, share the information, and celebrate achievement. If the goal has not been reached, the group leading the change identifies the barriers to its achievement and new strategies, plans a second cycle of change, and continues the effort for another specific time period. In the case of blood lead levels, efforts to achieve this goal are critical to ensuring the health of children and the opportunity for their academic success.

For all parents of young children, pediatric professionals need to provide clear and easily understood information about the methods and dangers of lead exposure (CDC,

cially after being on the floor. Parents/caregivers should be questioned about where they work and their hobbies. If they work in construction or demolition, a radiator repair shop, or with batteries or if they have a hobby that involves lead (eg, stained glass), they should remove the potentially contaminated clothing/shoes before coming home to avoid bringing lead into the home. Lead can leach into the home water supply from corroded fixtures or lead solder. Testing the water is the only way to accurately determine if lead is present. If lead in the water is suspected or confirmed, parents should be instructed to only use cold water for cooking, drinking, or reconstituting baby formula, and the cold water should be flushed for several minutes before use. If lead paint is in the home, parents/care-

givers should contact their local or state health departments to identify trained professionals to complete this task. A diet high in iron-rich foods and calcium may decrease lead absorption. Foods should not be stored or served in lead crystal or lead-glazed pottery (<http://www.epa.gov/lead>).

Brochures and flyers should be available in waiting rooms and distributed to parents of children 6 to 36 months of age (see Table). Brochures can be obtained from multiple sources or downloaded from the Internet. Educational videos such as Sesame Street Lead Away! can be played in the waiting or examination rooms to increase the knowledge level of both the parent/caregiver and the preschooler. Mailing reminder cards or leaving a reminder phone message about obtaining a blood lead test can underscore the importance of blood lead testing and provide information about when and where testing can occur (Polivka, 2004).

Although finger stick lead tests are available, they are less reliable because they are subject to falsely high results as a result of residual skin contamination with lead following inadequate cleansing prior to the finger stick. If the results indicate a high lead level, a serum blood lead level must then be obtained, necessitating a second appointment as well as a second painful procedure (Committee on Environmental Health, 1998). Drawing blood to determine a serum lead level at the outset will assure an accurate result and speed efforts to reduce child BLLs.

All parents appreciate efforts to minimize their child's distress with painful procedures. Several strategies have support in the research literature for reducing the pain and anxiety associated with needle use, but all require some degree of planning (Goodenough, Thomas, & Champion, 1999). These include nonpharmacologic strategies such as distraction by having the child blow on a pinwheel or watching a

child-friendly video (Kleiber & Harper, 1999). Application of ice for several minutes has also been shown to be helpful in reducing needle pain.

Pharmacologic strategies include the use of topical anesthetics such as eutectic mixture of local anesthetics (EMLA) and amethocaine (AMETOP) gel (Browne, Awad, Plant, McAdoo, & Shorten, 1999; Lander, et al., 1996; Smith, Peterson, & DeBerard, 1999; Wu & Julliard, 2003). These topical products cause reversible block to conduction along nerve fibers with the numbing effect wearing off a few hours after application. Their major disadvantage is the time required for them to become effective—EMLA takes an hour to become effective, whereas AMETOP requires 30 minutes. Thus, patients requiring venipuncture for a BLL test need to be identified on arrival so that the products can be applied promptly and become effective in a timely manner.

CONCLUSION

Many parents of very young children are misinformed and uninformed about the hazards of lead exposure, the most common environmental toxin effecting children. Parents look to pediatric professionals to alert them to preventable cause of harm to their children and to provide health care that reflects the standards of care established by governmental bodies and professional associations. Identifying EBLs in the most vulnerable of our young children is a critical way to make a difference in their lives and more than worth the time and distress to assure them an opportunity for a good future.

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